

# Material & Process Capability

## IN718 (UNS N07718)

IN718 is a precipitation-hardenable nickel-based superalloy. This data sheet specifies the expected mechanical properties and characteristics of this alloy when manufactured on a VELO<sup>3D</sup> Sapphire® system.

IN718 is characterized by having excellent tensile, creep, and rupture properties, particularly at high temperatures. IN718 has good corrosion resistance in various corrosive environments. Parts built from IN718 on a Sapphire system can be heat treated similar to those manufactured by other methods. All data is based on parts built using VELO<sup>3D</sup> standard 50 µm layer thickness parameters, using Praxair Tru-Form 718-35, a VELO<sup>3D</sup>-approved powder.

### General Process Data

Accuracy, Small Parts	±0.050 (±0.002)	mm (in)
Accuracy, Large Parts	±0.2	percent
Minimum Wall Thickness; up to 500:1 aspect ratio	0.200 (0.008)	mm (in)
Typical Volume Rate <sup>1</sup>	60	cc per hr
Density	8.19 (0.296)	g/cc (lbs/in <sup>3</sup> )
Relative Density	99.9+	percent
Surface Finish, Sa <sup>2</sup>	6 (240)	µm (µin)

### Mechanical Properties at Room Temperature

Property <sup>3</sup>	As Printed		After Heat Treatment <sup>4</sup>		
	Mean -3σ / Min	Average	Mean -3σ / Min	Average	
Modulus of Elasticity	103 (14.9)	110 (15.9)	166 (24.1)	199 (28.9)	GPa (MSI)
Ultimate Tensile Strength	912 (132)	953 (138)	1286 (187)	1320 (191)	MPa (KSI)
Yield (0.2% Offset)	512 (74.3)	603 (87.4)	1022 (148)	1063 (154)	MPa (KSI)
Elongation At Break	24.1	30.9	15.3	20.7	percent
Hardness, HRC			42.3	43.3	

### Notes

1. Geometry-dependent.
2. Depends on orientation and process selected.
3. Mechanical & test samples printed in vertical orientation.
4. Heat treatment per ASTM F3055 (HIP per ASTM F3055, solution & age per AMS 5662).